
Documentation

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Product Overview

This chapter provides physical and functional overviews of the Cisco uBR904 cable modem. It contains physical descriptions of the cable modem hardware and functional descriptions of hardware-related features.

The Cisco uBR904 cable modem is a part of a new class of Cisco data-over-cable products. The Cisco uBR904 cable modem is a compact, easy-to-install device that can receive and transmit digital data over hybrid fiber coaxial (HFC) cable; the same cable that brings television broadcast transmissions into a cable television (CATV) subscriber's home.

With a Cisco uBR904 cable modem, a personal computer can be connected to the HFC cable network for high-speed access to the Internet. The link that enables the transmission of two-way digital data from the HFC network to the Internet is provided by the Cisco uBR7246 universal broadband router installed at the cable headend.

The Cisco data-over-cable products, the Cisco uBR904 cable modem and the Cisco uBR7246 universal broadband router, are based on the Multimedia Cable Network Partners, Ltd. (MCNS) Data Over Cable Service Interface Specification (DOCIS) standards-based specifications. MCNS is a consortium of cable television companies whose goal is to create standards for interoperable data-over-cable systems.

The Cisco uBR904 cable modem operates with one external AC-input power supply.

The Cisco uBR904 cable modem provides the following features:

- High-speed access to the Internet---Downstream (receive) connection speeds of up to 36 Mbps, and upstream (send) connection speeds of up to 2 Mbps
- Multicast messages---Multiple users can receive important information at the same time
- User data privacy---Upstream and downstream data is encrypted to provide data privacy protection

- Downloadable software---Software and configuration information is downloaded from the cable headend to the cable modem

Note Data-over-cable systems are capable of providing access speeds up to 36 Mbps. That bandwidth, however, is shared by several subscribers because there are very few computers today that can connect to a network at such high speeds. Typical connection speeds to be expected are 5 Mbps downstream and 1 Mbps upstream.

To compare data-over-cable speeds with other Internet access technologies available today, a file that would take eight minutes to download over standard telephone lines with a 28.8 kbps modem would take two minutes to download over ISDN. The same file would take approximately eight seconds to download over a data-over-cable system.

Cable Modem Terminology

CATV Originally stood for Community Antenna Television. Now refers to any cable (coaxial/fiber) based system that provides television services.

Cable modem Any device that modulates and demodulates digital data onto a CATV plant.

Cable router A modular chassis-based router optimized for the data over CATV HFC application.

Channel A specific frequency allocation and bandwidth. Downstream channels used for television in the U.S. are 6 MHz wide.

CM Cable modem.

Downstream The set of frequencies used to send data from a headend to a subscriber.

Headend Central distribution point for a CATV system. Video signals are received here from satellite (either co-located or remote), frequency converted to the appropriate channels, combined with locally originated signals, and rebroadcast onto the HFC plant. For a CATV data system, the headend is the typical place to link between the HFC system and any external data networks.

HFC Hybrid fiber-coaxial (cable). Older CATV systems were provisioned using only coaxial cable. Modern systems use fiber transport from the headend to an optical node located in neighborhood to reduce system noise. Coax runs from the node to the subscriber. The fiber plant is generally a star configuration with all optical node fibers terminating at a headend. The coaxial cable part of the system is generally a trunk-and-branch configuration.

Host Any end-user computer system that connects to a network. In this guide, the term host refers to computer systems connected to the LAN interface of the cable modem.

Host Device See *Host* for details.

MCNS Multimedia Cable Network System Partners Ltd., a consortium of cable companies representing the majority of homes in the U.S. and Canada who have decided to drive a standard with the goal of

having interoperable cable modems.

QAM Modulation scheme mostly used in the downstream direction (QAM-64, QAM-256). QAM-16 is expected to be usable in the upstream direction. Numbers indicate number of code points per symbol. Number of bits per symbol can be computed by $2^{(\text{number of bits/symbol})} = \text{number of code points}$.

QPSK Modulation scheme used in the upstream direction. Supports two data bits per symbol.

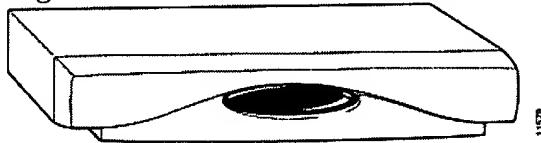
Subscriber Unit (SU) A term used for cable modems. See *Cable Modem* for a description.

Upstream The set of frequencies used to send data from a subscriber to the headend.

Physical Description

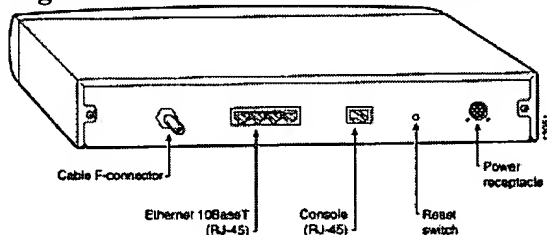
The front of the Cisco uBR904 cable modem (see [Figure 1-1](#)) provides a basic operating status display using 16 LEDs. For a description of the LEDs, see the section, "[Troubleshooting the Power Subsystem Using LEDs](#)" in the chapter, "[Troubleshooting the Installation](#)."

Figure 1-1: Cisco uBR904 Cable Modem---Front View



The rear of the Cisco uBR904 cable modem (see [Figure 1-2](#)) provides the receptacles to connect the unit to the CATV network, a console device, and a personal computer.

Figure 1-2: Cisco uBR904 Cable Modem---Rear View



The Cisco uBR904 cable modem operates as a desktop device. Place it on a sturdy desktop or platform near the personal computer to which it will be connected.

System Specifications

[Table 1-1](#) lists the Cisco uBR904 cable modem physical specifications and power requirements.

Table 1-1: Cisco uBR904 Cable Modem Physical Specifications

| Description | Specification |
|-------------------------|---|
| Dimensions (H x W x D) | 2.30 x 13.50 x 9.30 in. (5.08cm x 34.29cm x 24.77cm) |
| Weight | ~ 4.5 lb (~ 2.04 kg) for the Cisco uBR904 ~ 0.5 lb (~ 0.23 kg) for the AC-input external power supply |
| AC-input voltage | 120 to 240 VAC ¹ wide input with power factor correction |
| AC-input current rating | 1.2A ² maximum at 120 VAC and 0.6A maximum at 240 VAC |
| AC-input cable | 18 AWG ³ three-wire cable, with a three-lead receptacle on the power supply end, and a North American (NEMA 5-15P) plug on the power source end |
| Power dissipation | 12 to 15W |
| Frequency | 50/60 Hz ⁴ |
| Temperature | 23 to 113° F (0 to 40° C) operating; -13 to 95° F (-25 to 70° C) nonoperating |
| Humidity | 5 to 95% noncondensing |
| Noise level | 38 dBA ⁵ maximum at desktop, 43 dBA maximum in an office |
| Software requirement | Cisco uBR904 Cable Modem software and Cisco IOS Release 11.3(7) NA or later. |
| Agency approvals | Safety: UL 1950, CSA 22.2 No. 950, EN60950 EMI: FCC Class A, FCC Class B, CSA Class A, EN60555-2, EN55022 Class B, VCC1 Class 2, AS/NZS 3548 Class A Immunity: IEC-1000-4-2, IEC-1000-4-3, IEC-1000-4-4, IEC-1000-4-5, IEC-1000-4-6, IEC-1000-4-11, IEC-1000-3-2, IEC 60950, AS3260, TS001 See also the <i>Regulatory Compliance and Safety Information for the Cisco uBR904</i> document. |

¹VAC = volts alternating current.

²A = ampere.

³AWG = American Wire Gauge.

⁴Hz = hertz.

⁵dBA = adjusted decibels.

Note For footprint information and additional dimensions, refer to the section "[Site Requirements](#)" in the chapter "[Preparing for Installation](#)."

Power Supply

The Cisco uBR904 cable modem uses one external AC-input power supply. The OK (power) LED on the front of the cable modem indicates that the power supply is supplying power to the unit. [Table 1-1](#) lists the AC-input power supply power specifications, including input voltage and operating frequency ranges.

The bottom, sides, and rear of the cable modem must remain unobstructed to ensure adequate airflow and prevent overheating inside the unit. The rubber feet on the bottom of the cable modem provide enough clearance when the unit is placed on a flat, hard surface. Do not place the cable modem on an uneven or soft surface. We recommend at least 3 inches of clearance at the rear of the cable modem. (See the section "[Site Requirements](#)" in the chapter "[Preparing for Installation](#)."

Compliance with U.S. Export Laws and Regulations Regarding Encryption

Cisco cable modem cards perform encryption and are regulated for export by the U.S. Government. Following is specific information regarding compliance with U.S. export laws and regulations for encryption products:

- Cisco cable modem cards are *not* authorized for use by persons located outside the United States and Canada that do not have export license authority from the U.S. Government.
- Cisco cable modem cards may *not* be exported outside the U.S. and Canada either by physical or electronic means without the *prior* written approval of the U.S. Government.
- Persons outside the U.S. and Canada may *not* reexport, resell, or transfer Cisco cable modem cards by either physical or electronic means without prior written approval of the U.S. Government.

Functional Overview

This section provides a functional overview of the Cisco uBR904 cable modem. It describes the cable modem Media Access Control (MAC) address, connection, and configuration. These descriptions will help you become familiar with the functions of the Cisco uBR904 cable modem.

MAC-Layer Address

All local-area network (LAN) devices, such as cable modems, require unique MAC-layer addresses, also known as *hardware* addresses. The MAC address of a Cisco uBR904 cable modem is stored in the unit. You should record the MAC address on the site installation sheet provided in the chapter, "Preparing for Installation."

Cisco uBR904 Cable Modem Cable Connections

The Cisco uBR904 cable modem is connected to CATV coaxial cable and to an Ethernet port on a personal computer. The personal computer must have an Ethernet network card installed; either an internal card installed in the computer chassis, or a PCMCIA adapter card and cable installed on a laptop computer.

The coaxial cable connection uses standard connectors at both ends of the coaxial cable, and an F-connector on the back of the cable modem. The F-connector is labeled "Cable TV In." The Ethernet connections use straight-through Ethernet cables with RJ-45 connectors at both ends, and RJ-45 receptacles on the back of the cable modem. The RJ-45 connectors are labeled 1X, 2X, 3X, and 4X.

Note One straight-through Ethernet cable with RJ-45 connectors has been included with your Cisco uBR904 cable modem. Additional RJ-45 cables are also available from outside commercial cable vendors.

If you are connecting the Cisco uBR904 cable modem to a hub at the installation site (to provide access

to the cable modem from multiple computers), you need to use a crossover Ethernet cable with RJ-45 connectors.

Note Crossover Ethernet cables are not available from Cisco Systems; they are available from Cisco and outside commercial cable vendors. Optionally, you can use a straight-through Ethernet cable and connect to the uplink port on your hub (often labeled Uplink or MDI).

Airflow and Cooling

To keep the Cisco uBR904 cable modem operating at optimal internal temperature, keep the bottom, sides, and rear of the cable modem clear of obstructions and away from the exhaust of other equipment.

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Hh

- HACBSS** Homestead and community Broadcasting Satellite Service. Remote area DBS service via AUSSAT.
- Hall Circuit** The uplink and downlink between the same earth station and a satellite.
- Half-Transponder** A method of transmitting two TV signals through a single transponder, by reducing the deviation and power allocated to each. TV carriers each operate typically 4 dB to 7 dB below single-carrier saturation power.
- Hall Effect Sensor** A semiconductor device in which an output voltage is generated in response to the intensity of a magnetic field applied to a wire. In an actuator, the varying magnetic field is produced by the rotation of a permanent magnet past a thin wire. The pulses generated serve to count the number of rotations of the motor.
- Hard Drawn Copper Wire** Copper wire that has not been annealed after drawing.
- Hard-line** A low-loss coaxial cable that has a continuous metal shield instead of a conductive braid around the outer perimeter. This type of cable was used in the pioneer days of satellite television.
- HDTV** High-definition television.
- Head Unit** Alternative term for an LNA, LNB, or LNC. Also called the outdoor unit.
- Headend** Central distribution point for a CATV or MATV system. i.e. The portion of an SMATV system where all desired signals are received and processed for subsequent distribution.
- Helix** A thick low-loss cable used at high frequencies; also known as hard-line.
- Hemispheric Beam** Shaped beam covering approximately half of the visible Earth's surface (21 percent of the total globe), as seen from the satellite. INTELSAT spacecraft carry east and west hemispheric beams, while Russian Gorizont and Raduga satellites are equipped with northern hemispheric beams illuminating the visible portion of the globe which lies north of the equator.
- HEMT** High Electron Mobility Transistor.
- Hertz** The name given to the basic measure of radio frequency. An electromagnetic wave completes a full oscillation from its positive to its negative pole and back again in what is known as a cycle. A single Hertz is thus equal to one cycle per second.
- Hi-Pot** A term designed to determine the highest voltage that can be applied to a conductor without breaking through the insulation.
- High Definition Television (HDTV)** An innovative television format having approximately twice the number of scan lines in order to improve picture resolution and viewing

| | |
|-----------------------------------|--|
| | quality. |
| High Power Amplifier (HPA) | An amplifier used to amplify the uplink signal |
| High Power Satellite | Satellite with transponder RF power in excess of about 100 watts. |
| Horizontal Blanking Pulse | The pulse that occurs between each horizontal scan line and extinguishes the beam illumination during the retrace period. |
| Horizontal Sync Pulse | A 5.08 microsecond (4.7 microsecond in the PAL system) rectangular pulse riding on to of each horizontal blanking pulse. It synchronizes the horizontal scanning at the television set with that of the television camera. |
| Hour Angle | Angle between antenna beam and meridian plane (measured in equatorial plane). Steering direction of a polar mount antenna. |
| HPA | High-Power amplifier (esp. in an upline). Usually a TWTA or a Klystron. |
| HPF | High-Pass Filter. |
| Hue | Spectral tint parameter in a color video signal. |
| Hum Bars | A form of interference seen as horizontal bars or black regions passing across the field of a television screen. |
| Hypalon | Dupont's trade name for their chlorosulfonated polyethylene, an ozone resistant synthetic rubber. |

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